# i-SEQ



i-SEQ is really a program created for the Arduino Uno or Arduino Pro Mini 16Mhz, together with a 16X2 LCD screen with I2C, 3 buttons and outputs for relays that allows you to activate / deactivate reception and transmission preamplifiers sequentially using the Icom IC-9700 transceiver.i-SEQ through the C-IV port of the transceiver, will switch to transmission / reception when the transceiver gives the command, activating / deactivating the amplifiers depending on the band in which it is being transmitted. You don't need a PC to set it up.

All the circuits necessary for its operation are simple and within the reach of any radio amateur and are described in this manual as well as its connection. It is an inexpensive sequencing system. The software is upgradeable, so you can update the program yourself.

The software has been developed to be as simple as possible to use. It has a menu to configure it according to the user's needs, in the functions it has.



#### **Characteristics**

Allows preamp control for 144, 432, and 1296. Allows amp control for 144, 432, and 1296. Control by C-IV Control by External PTT. Allows Satellite mode. Allows baud rate change. Allows change of Hexadecimal address. Allows time change for relays. TX / RX control detected on the transceiver. Fully upgradeable. Configuration without PC. Very inexpensive and easy to build. New free versions once the first license is obtained. Etc.

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# **SOFTWARE AND INSTALLATION PACKAGE :**

The handling and installation has been tried to make it as simple as possible. The software package consists of 1 program and this manual:

-Program i-SEQ . (i-SEQ .Hex)

In order to record the software in Arduino you must use additional software capable of recording the file in hexadecimal (.HEX) format called Xloader.

XLOADER, you can download it on my web page www.ea7hg.com

The operation is very simple and intuitive. First select the COM: port to which your Arduino is connected. Select the i-SEQ.HEX file and press Upload.

Once the file is loaded in the arduino, perform a reset. See page 8

## STARTING i-SEQ:

Once i-SEQ is turned on, the screen will first show us the welcome with its callsign and version.



and a couple of seconds later the author of i-SEQ.



When the presentation is finished, the screen shows the following information at the start of i-SEQ in case it is not connected to the transceiver.



The default i-SEQ setting is 19200 Baud, hexadecimal address A2 and 20 ms delay for activation of transmission amplifiers. Once the i-SEQ configuration has been changed, it will start as configured.

# **I-SEQ DISPLAY IN RX MODE:**



If i-SEQ has communication with the transceiver through the C-IV port, it will show us in the upper line of the screen the model of the transceiver and the band read. In the lower line of the screen, it will indicate that the transceiver is in reception and the outputs for the 144,432 and 1296 Mhz preamps are activated. In the event that the correct band is not received, IC9700-OUT will be displayed on the screen.

In case you are in Satellite mode on your transceiver the screen will show IC9700-SAT

# **I-SEQ DISPLAY IN TX MODE:**



In the upper line of the screen it will show us the model of the transceiver. After this, it will indicate that the transceiver is transmitting in the band it indicates and therefore it has activated the relay output of the amplifier corresponding to that band. In the lower line of the screen, it will indicate that the outputs for the preamplifiers are active for the indicated bands.

Example of this screen:

In the upper line it indicates that the transceiver is transmitting in the 144Mhz band and that it has activated the relay output for the 144Mhz amplifier. In the lower line it indicates that only the outputs for the 432 and 1296 Mhz preamplifiers are activated and therefore the 144 Mhz preamplifier output is disabled, that is, the preamplifier is disconnected.

# I-SEQ MENU :

To access the I-SEQ Menu, just press the MENU / OK button. Menu will be shown on the first line and "<<" will appear on the second line.



By indicating the second line "<<" if we press the MENU / OK button we will exit the Menu returning to the i-SEQ screen again.

If we press the Up or Down button, the different i-SEQ configuration options will appear, which are the following:

- BAUD
- HEX
- REL
- MODE RX AMP
- PTT
- PWR DELAY
- <<

To access any of the options, just press the MENU / OK button on the desired option.

# MENU : BAUD:

Allows you to select the communication speed between the IC9700 transceiver and o\_SEQ. It will allow us by pressing the Up / Down buttons to change the baud rate. To record the desired value, just press the MENU / OK button. The allowed values are: 4800,9600,19200 and 38400.

### MENU : HEX:

Select the Hexadecimal address assigned to the IC9700 transceiver. It will allow us by pressing the Up / Down buttons to change the Hexadecimal address. To record the desired value, just press the MENU / OK button. The allowed values are: 00h to FFh.

#### MENU : REL:

It allows selecting the waiting time to activate the relay for the transmission amplifier as well as the return to reception. Pressing the Up / Down buttons will allow us to change the time in milliseconds. To record the desired value, just press the MENU / OK button. The allowed values are: 0 to 255.

#### **MENU : MODE RX AMP:**

Allows you to select whether to turn off only the receive preamplifier relay of the band in which it is transmitted or all the receive preamplifier relays. Pressing the Up / Down buttons will allow us to change the shutdown mode. To record the desired value, just press the MENU / OK button.

#### MENU : PTT

Allows you to enable an external PTT, such as a pedal. This PTT does not refer to the Icom ACC connector pin, which is not used by i-Seq or which works automatically. In the case of enabling the external PTT, the text EXT will appear on the screen. If it is in automatic it will show Auto. It will allow us by pressing the Up / Down buttons to change the off mode. To record the desired value, just press the MENU / OK button.

#### **MENU: PWR DELAY:**

Allows you to select the waiting time for the power to activate once the transmission amplifier relay has been activated. It will allow us by pressing the Up/Down buttons to change the time in milliseconds. To record the desired value, just press the MENU/OK button. The allowed values are: 0 to 255 ms.

# I-SEQ RESET :

In the event of a malfunction or to configure the default parameters of i-SEQ, you can perform a memory reset.

To perform the RESET, you must turn off i-SEQ. Once turned off press the Menu / OK button and without releasing it turn on i-SEQ. Once RESET appears on the screen, stop pressing the Menu / OK button and i-SEQ will restart with the default parameters.

#### **I-SEQ default parameter table :**

Parameter	Value
Bauds	19200
Hexadecimal Address	A2
Time Relay Amplifiers	20 ms
Mode Rx Amp	Normal
РТТ	Auto
PWR DELAY	20ms

#### **CONFIGURATION ON IC9700 :**

To use i-SEQ with the IC9700 we must configure the IC9700 as follows:

We enter the **Menu> Connectors> C-IV** and the configuration will be as follows:

C-IV Baud Rate = The same speed that we have we must configure it in i-SEQ. C-IV Address = The same address that we have we must configure it in i-SEQ. C-IV Transceive = ON. C-IV USB-REMOTE Transceive Addres = 00h. C-IV USB Port = Unlink from [REMOTE]. C-IV USB Echo Back = ON.

We leave the **Menu** and enter the **Menu** again.

We will select **SET> FUNCTION> TX DELAY** and select the maximum time for each band.

We leave the **Menu**.

This way you can use i-SEQ through C-IV, even if you are using WSJT through the USB port for example.

# **COMPONENTS AND CONNECTION :**

To use i-SEQ we need the following components:

- Arduino Uno, Arduino Nano or Arduino Pro-mini. (The Arduino Pro.mini, since it does not have a USB port, will need a TTL-RS232 or TTL-USB adapter to be able to record the program).
- LCD 2X16 with I2C (with PCF8574).
- 3 buttons (MENU / OK, Up, Down);
- Integrated circuit ULN2003 or UNL2803 or small circuit with transistor for relay activation.
- TTL-C-IV adapter for communication between i-SEQ and your transceiver.
- 3 100K pF ceramic capacitors.

# **VERY IMPORTANT:**

# <u>Use quality components and wiring to avoid i-Seq</u> <u>malfunction.</u>

# **ARDUINO CONNECTION TABLE:**

PIN ARDUINO	FUNCTION
2	PTT External
4	Relay Output Preamplifier 144
5	Relay Output Preamplifier 432
6	Relay Output Preamplifier 1296
7	Relay Output Amplifier 144
8	Relay Output Amplifier 432
9	Relay Output Amplifier 1296
10	RX TTL - C-IV
11	TX TTL - C-IV
A0	ButtonMENU/OK
A1	Button Down
A2	Button UP
A4	SDA LCD
A5	SCL LCD

#### **ARDUINO CONNECTION WITH LCD:**

The image refers to the Arduino UNO. The connection pins are the same for the Arduino ProMini and Arduino Nano. On some boards the digital pins are marked with the letter D and the Pin number. Example: D10 pin on Arduino Uno is marked as 10.



# **ARDUINO CONNECTION WITH PUSH BUTTONS:**

The image refers to the Arduino UNO. The connection pins are the same for the Arduino ProMini and Arduino Nano.



#### **ARDUINO CONNECTION WITH PORT C-IV (TTL):**

The image refers to the Arduino UNO. The connection pins are the same for the Arduino ProMini and Arduino Nano. On some boards the digital pins are marked with the letter D and the Pin number. Example: D10 pin on Arduino Uno is marked as 10.

Connected to use the TTL port for the transceiver :



# ARDUINO CONNECTION WITH RELAYS AND PTT EXTERNAL:

The image refers to the Arduino UNO. The connection pins are the same for the Arduino ProMini and Arduino Nano.On some boards the digital pins are marked with the letter D and the Pin number. Example: D10 pin on Arduino Uno is marked as 10.

In example, the integrated ULN2003 C. has been used for 6 relays. Likewise, the integrated C. UNL2803A can be used for 8 relays, using six inputs / outputs of the eight available, being the same pinout, except that the GND pin is 9 and the VCC pin is 10.Ver Datasheet from the manufacturer.



Instead of using a ULN2003 / ULN2803 integrated circuit to activate the relays, this can be replaced by a simple resistance and a BC337 transistor or similar for each relay.



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